

Prim's Algorithm

We consider a weighted connected graph G with n vertices. Prim's algorithm finds a minimum spanning tree of G .

procedure $Prim(G$: weighted connected graph with n vertices)

$T :=$ a minimum-weight edge

for $i = 1$ **to** $n - 2$

begin

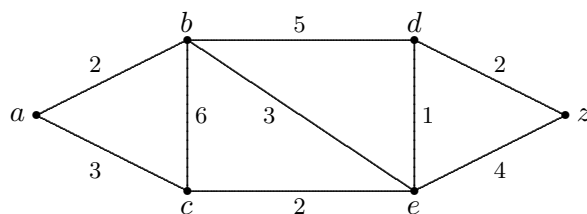
$e :=$ an edge of minimum weight incident to a vertex in T and not forming a circuit in T if added to T

$T := T$ with e added

end

return(T)

Example: Use Prim's algorithm to find a minimum spanning tree in the following weighted graph. Use alphabetical order to break ties.



Solution: Prim's algorithm will proceed as follows. First we add edge $\{d, e\}$ of weight 1. Next, we add edge $\{c, e\}$ of weight 2. Next, we add edge $\{d, z\}$ of weight 2. Next, we add edge $\{b, e\}$ of weight 3. And finally, we add edge $\{a, b\}$ of weight 2. This produces a minimum spanning tree of weight 10. A minimum spanning tree is the following.

